

What is claimed is:

1. A method of allocating a spare area for a recording medium, comprising:
 - recording data in a data area of the recording medium according to a first recording operation;
 - creating information regarding an adjustment of a size of an allocated spare area of the recording medium, based on a defect detected in the recorded data during the first recording operation;
 - recording the information regarding the adjustment of the size of the spare area and information regarding the defect, in the data recorded according to the first recording operation, as first temporary defect information in the data area of the recording medium; and
 - recording defect management information to the recording medium for managing the first temporary defect information as first temporary defect management information in a temporary defect management information area of the recording medium in at least one of a lead-in area, a lead-out area, and an outer area of the recording medium.
2. The method of claim 1, further comprising:
 - repeating another recording of data in the data area, a recording of another spare area size adjustment information, a recording of additional defect information, and recording of defect management information on the recording medium, and creating information regarding the additional adjusted spare area size while increasing an index of another recording operation, another temporary defect information area, and the temporary defect management information, by 1; and
 - recording a lastly recorded temporary defect management information and temporary defect information in a defect management area (DMA) of the recording medium in at least one of the lead-in area, the lead-out area, and the outer area of the recording medium.
3. The method of claim 2, wherein the recording of the lastly recorded temporary defect management information and temporary defect information is performed after recording data in the data area according to a last recording operation.
4. The method of claim 2, wherein the recording of the lastly recorded temporary defect management information and temporary defect information further comprises recording information regarding position information of recorded data in the data area.

5. The method of claim 4, wherein the recording of the lastly recorded temporary defect management information and temporary defect information further comprises recording at least one of a physical sector number and a logical sector number as the position information.

6. The method of claim 1, wherein the creating of the information regarding the adjustment of the size of the allocated spare area comprises:

calculating an occurrence rate of defects; and

creating information regarding the adjustment of the size of the allocated spare area based on the calculated occurrence rate.

7. The method of claim 6, wherein the creating of the information regarding the adjustment of the size of the allocated spare area based on the calculated occurrence rate uses the occurrence rate of defects and the adjustment of the size of the allocated spare area, or the occurrence rate of defects and a mapping table in which possible positions of the spare area are mapped.

8. The method of claim 6, wherein the creating of the information regarding the adjustment of the size of the allocated spare area based on the calculated occurrence rate comprises using information regarding starting position of the spare area to create the adjustment of the size of the allocated spare area.

9. The method of claim 6, wherein the creating of the information regarding the adjustment of the size of the allocated spare area based on the calculated occurrence rate comprises information regarding a size of the spare area as the spare area information.

10. The method of claim 1, wherein the recording of data in the data area of the recording medium according to the first recording operation comprises:

recording data in predetermined units of data on the recording medium;

verifying the recorded data to detect an area of the recorded data in which a defect occurs;

storing information designating the area having the defect and subsequent area, in which data is recorded after the area having the defect, as a defective area, in memory;

recording data, on the recording medium, after the defective area in predetermined units, and

the recording of the adjustment of the size of the allocated spare area and the defect information comprises reading the first temporary defect information from the memory and recording the read first temporary defect information in a first temporary defect information area of the data area on the recording medium.

11. The method of claim 10, wherein the recording of data in the data area of the recording medium according to the first recording operation further comprises recording, on the recording medium, information designating the first temporary defect information area as a defective area in the first temporary defect information area.

12. The method of claim 1, further comprising:

repeating a cycling of another recording of data in the data area, a recording of additional defect information, and recording of defect management information on the recording medium for multiple recording operations; and

alternately recording information regarding additional adjusted spare area size for sequential recording operations.

13. The method of claim 1, wherein the size of the spare area is reduced when an occurrence rate of defects is smaller than a predetermined threshold.

14. The method of claim 1, wherein the size of the spare area is increased when an occurrence rate of defects is greater than a predetermined threshold.

15. A recording or recording and reproducing apparatus, comprising:

a recording/reading unit to record/read data on/from a recording medium; and

a controller to control the recording/reading unit to record information, regarding a defect in data recorded in a data area of the recording medium according to a first recording operation, as first temporary defect information in the data area, to adjust a size of a spare area, of the recording medium, based on the defect and to control the recording/reading unit to record information regarding an adjustment of a size of the spare area in a first temporary defect management information area, and to control the recording/reading unit to record defect management information to manage the first temporary defect information area as first temporary defect management information in a temporary defect management information area

on the recording medium in at least one of a lead-in area and a lead-out area of the recording medium.

16. The apparatus of claim 15, wherein the controller controls the recording/reading unit to record data in the data area while increasing an index of another recording operation, another temporary defect information, and another temporary defect management information, by 1, and controls the recording/reading unit to record a lastly recorded temporary defect management information and temporary defect information in a defect management area, on the recording medium in at least one of the lead-in area and the lead-out area of the recording medium.

17. The apparatus of claim 15, wherein the controller calculates an occurrence rate of defects in the data recorded according to the first recording operation and adjusts the adjustment of a size of the allocated spare area based on the calculated occurrence rate.

18. The apparatus of claim 15, wherein the controller creates information regarding the adjustment of a size of the allocated spare area, based on an occurrence rate of defects and the spare area size, or the occurrence rate of defects and a mapping table in which possible positions of the spare area are mapped.

19. The apparatus of claim 15, wherein the controller creates a starting position information of the spare area as spare area information.

20. The apparatus of claim 15, wherein the controller creates information regarding a size of the spare area as spare area information.

21. The apparatus of claim 15, further comprising memory, and wherein the controller controls the recording unit to record data in predetermined units of data according to a predetermined recording operation, verifies the recorded data to detect the defect in the recorded data, creating defective area information, used to designate an area of the recording medium having the defect and data recorded after the area having the defect, as a defective area, and stores the defective area information as an ith temporary defect information in the memory, controls the recording unit to record data in predetermined units of data after the defective area according to the predetermined recording operation, and controls the

recording/reading unit to read the ith temporary defect information from the memory after completing recording of data according to the predetermined recording operation and record the read data in an ith temporary defect information area of the data area on the recording medium.

22. The apparatus of claim 15, wherein:

the controller repeats a cycling of another recording of data in the data area, a recording of additional defect information, and recording of defect management information on the recording medium for multiple recording operations; and

the controller alternately records information regarding additional adjusted spare area size for sequential recording operations.

23. The apparatus of claim 15, wherein a size of the spare area is reduced when an occurrence rate of defects is smaller than a predetermined threshold.

24. The apparatus of claim 15, wherein a size of the spare area is increased when an occurrence rate of defects is greater than a predetermined threshold.

25. A write once recording medium having a single record layer in which a lead-in area, a data area, and a lead-out area are sequentially formed, the recording medium comprising:

a defect management area on the recording medium in at least one of the lead-in area and the lead-out area; and

a temporary defect management information area which is present in at least one of the lead-in area and the lead-out area and in which information regarding a spare area is recorded to enable defect management of the recording medium.

26. The recording medium of claim 25, wherein management information for managing the temporary defect management information area to be recorded in the temporary defect management information area.

27. The recording medium of claim 25, wherein spare area information contains information regarding a starting position of the spare area.

28. The recording medium of claim 25, wherein spare area information contains information regarding a size of the spare area.
29. The recording medium of claim 25, wherein information indicating a position of user data in the data area, is recorded in the defect management area.
30. The recording medium of claim 25, wherein a size of the spare area is reduced when an occurrence rate of defects is smaller than a predetermined threshold.
31. The recording medium of claim 25, wherein a size of the spare area is increased when an occurrence rate of defects is greater than a predetermined threshold.